

JPRS-UCH-85-003

6 February 1985

# USSR Report

CHEMISTRY



FOREIGN BROADCAST INFORMATION SERVICE

#### NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

#### PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service (NTIS), Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semimonthly by the NTIS, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

Soviet books and journal articles displaying a copyright notice are reproduced and sold by NTIS with permission of the copyright agency of the Soviet Union. Permission for further reproduction must be obtained from copyright owner.

6 February 1985

USSR REPORT  
CHEMISTRY

## CONTENTS

## ADSORPTION

- Adsorption and Absorption of Oxygen on Platinum and Effect of  
Electrode Surface State on Separation of These Processes  
(V.A. Gromyko, Yu.B. Vasil'yev; ELEKTROKHIMIYA,  
No 10, Oct 84)..... 1
- Adsorption Phtalocyanine Catalysts. Synthesis, Layer  
Structure and Catalytic Activity  
(S.A. Borisenkova; VESTNIK MOSKOVSKOGO UNIVERSITETA:  
KHIMIYA, No 5, Sep-Oct 84)..... 1
- Change in Adsorption Properties of Platinum Surface After  
Electron Bombardment in Carbon Monoxide  
(A.P. Koshchev; ZHURNAL FIZICHESKOY KHIMII, No 10,  
Oct 84)..... 2

## ANALYTICAL CHEMISTRY

- Academician Discusses Synthetic Compounds  
(LENINGRADSKAYA PRAVDA, Nov 84)..... 3
- Book: Bases for Automating Analytical Control of Chemical  
Industries  
(V.A. Prokhorov; OSNOVY AVTOMATIZATSII ANALITICHESKOGO  
KONTROLYA KHIMICHESKIKH PROIZVODSTV, 1984)..... 6
- Determination of Trace Quantities of Uranium (IV) by  
Chemiluminescence Method  
(V.V. Yakshin, N.L. Khokhlova, RADIOKHIMIYA, No 5,  
Sep-Oct 84)..... 10
- Study of Direct Acid Processing of Phosphate Ore from Teleksk  
Deposits  
(V.P. Panov, E.N. Chulkova, et al.; IZVESTIYA VYSSHIKH  
UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA  
TEKHNOLOGIYA, No 9, Sep 84)..... 10

Destruction of Sulfur-Containing Organic Substances in  
Ammoniacal Plasma of High Energy Discharge  
(M.A. Volodina, A.S. Arutyunova, et al.; VESTNIK MOSKOVSKOGO  
UNIVERSITETA: KHIMIYA, No 5, Sep-Oct 84)..... 11

Photolysis of Ozone and Ozone-Hydrogen Mixtures in Shappoi Band  
Region  
(S.N. Tkachenko, M.P. Popovich, et al.; VESTNIK  
MOSKOVSKOGO UNIVERSITETA: KHIMIYA, No 5, Sep-Oct 84)..... 11

## BIOCHEMISTRY

Complexes of Cobalt (III) with Oxime Derivatives as Catalysts  
of Electron Transport from Components of Respiratory Chain  
(G.N. Novodarova, L.L. Kiseleva, et al.; IZVESTIYA  
AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, No 10,  
Oct 84)..... 12

## CATALYSIS

Effect of Carbon Carrier Nature on Electrocatalytic Properties  
of Rh/C Electrodes  
(G.D. Zakumbayeva, L.A. Beketayeva, et al.;  
ELEKTROKHIMIYA, No 10, Oct 84)..... 13

Study of Changes in Composition of Adsorbed Layer Leading to  
Deactivation of Catalyst  
(Z.G. Bateniva, D.V. Sokol'skiy, et al.; IZVESTIYA  
VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I  
KHIMICHESKAYA TEKHOLOGIYA, No 9, Sep 84)..... 14

Study of Raney Nickel Catalysts by Gamma-Resonance Spectroscopy  
(A.S. Khlystov, A.B. Fasman; ZHURNAL FIZICHESKOY KHIMII,  
No 10, Oct 84)..... 14

Catalytic Activity in Hydrogenation Reactions of Pd Metal  
Complexes Fixed on Silica Gels Modified by Tertiary Amines  
and Quaternary Ammonium Bases  
(V.Z. Sharf, M.A. Nesterov, et al.; IZVESTIYA AKADEMII  
NAUK SSSR: SERIYA KHIMICHESKAYA, No 10, Oct 84)..... 15

## COMBUSTION

Secondary Reactions During Infrared Multiphoton Dissociation  
of  $CF_3I$  Molecules  
(V.N. Bagratashvili, V.N. Burimov, et al.; KHIMICHESKAYA  
FIZIKA, No 10, Oct 84)..... 16

## ELECTROCHEMISTRY

Structure and Applications of New Solid Electrolytes  
(ZNANIYE-SILA; No 10, Oct 84)..... 17

Catalysts Used for Synthesizing Amines (Ya. Paushkin; SOVETSKAYA BELORUSSIYA, Oct 84).....	19
Reaction Kinetics of Radicals Formed by Pulsed Electron Irradiation of Cyclic Alcohols in Liquid Phase (B.Ya. Ladygin, G.M. Zimina, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, No 10, Oct 84).....	21
Potentiodynamic Measurements on Semiconductor Electrodes. Indium Antimonate (O.V. Romanov, M.A. Sokolov; ELEKTROKHIMIYA, No 10, Oct 84).....	21
High Temperature Gas Co-Electrode From Platinum in Fused Silicate (B.A. Kukhtin, G.A. Podgornova; ELEKTROKHIMIYA, No 10, Oct 84).....	22
Electrochemical Properties of Anode Bismuth Oxide Films. Capacity Measurements (S.K. Poznyak, A.I. Kulak; ELEKTROKHIMIYA, No 10, Oct 84).....	23
Photoeffect Sensitization with Dyes of Ferroelectrics- Semiconductors (I.A. Akimov; ELEKTROKHIMIYA, No 10, Oct 84).....	23
Solar Energy Conversion in Sulfuric Acid Anhydride and Water Conversion Reactions in Molecular Photocatalytic System (V.N. Parmon, Ye.N. Savinov, et al.; ZHURNAL FIZICHESKOY KHIMII, No 10, Oct 84).....	24

#### FREE RADICALS

Study of Kinetics of Radical Accumulation During Photolysis of Polytetrafluoroethylene with Light at 147 and 123.6 NM (Yu.P. Baydarovtsev, V.N. Vasilets, et al.; KHIMICHESKAYA FIZIKA, No 10, Oct 84).....	25
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----

#### INORGANIC COMPOUNDS

Thermodynamic Study of NaBr, NH <sub>4</sub> Br, KBr and ND <sub>4</sub> Fr Solutions in Water and Heavy Water Mixtures with N,N-Dimethylformamide (V.V. Toropov, V.P. Korolev, et al.; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA, No 9, Sep 84).....	26
Thermal Decomposition of Thorium and Uranium (IV) Chloroacetates (Yu.S. Matveyev, K.M. Dunayeva; VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA, No 5, Sep-Oct 84).....	26

Reaction of Silicon and Titanium with Aluminum (S.B. Orynbekov, U.M. Makanov, et al.; VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA, No 5, Sep-Oct 84).....	27
Possibilities of Forming Graphite Inclusion Compounds with Various Metals (K.N. Semenenko, V.V. Avdeyev, et al.; VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA, No 5, Sep-Oct 84).....	27
Reaction of Mg-Ca-Ce System Alloys with Hydrogen (K.N. Semenenko, V.N. Verbetskiy, et al.; VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA, No 5, Sep-Oct 84).....	28
Mechanical-Chemical Synthesis and Physical Chemical Study of Pyridine Borane (V.V. Volkov, K.G. Myakishev, et al.; IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKIKH NAUK, No 5, Sep 84).....	28
Growing Potassium Bromate Crystals from Aqueous Solutions of Lead and Sodium Nitrate (B.I. Kidyarov, R.R. Nev'yantseva, et al.; IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKIKH NAUK, No 5, Sep 84).....	29
ION EXCHANGE PHENOMENA	
Selectivity of Adsorption of Transition Metal Cations on Sulfonate Cationite KU-2-4 from Multicomponent Solutions in Presence of Pyridine (G.N. Al'tshuler, M.P. Kirsanov; IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKIKH NAUK, No 5, Sep 84).....	30
ORGANOPHOSPHORUS COMPOUNDS	
Synthesis of Optically Active O-Methyl-O-Arylphenylthiophos- phonates and Their Properties (M.N. Dimukhametov, I.S. Iraidova, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, No 10, Oct 84).....	31
PETROLEUM PROCESSING TECHNOLOGY	
Adsorbents From High Molecular Weight Compounds of Petroleum (Yu.V. Pokonova, M.S. O'eynik, et al.; KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL, No 10, Oct 84).....	32
Production of High Octane Gasoline by Hydroisomerization of Reforming Catalysates (A.F. Akhmetov, M.A. Tanatarov, et al.; KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL, No 10, Oct 84).....	32

Production of Depressor Additive to Diesel Fuel by Copolymerization of Ethylene with Vinylacetate (V.I. Ivanov, G.G. Krasnyanskaya, et al.; KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL, No 10, Oct 84).....	33
Hydroenrichment of Deparaffinized Oil on G-24/1 Equipment (A.K. Khasanov, G. Nurmatov, et al.; KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL, No 10, Oct 84).....	33
Polyfunctional Additive to Fuels (R.N. Zagidullin, A.T. Gil'mutdinov, et al.; KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL, No 10, Oct 84).....	34
Antifrictional and Wear Resistant Properties of Dialkyldithioaminophosphates (S.B. Borshchevskiy, Ye.V. Shabanova, et al.; KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL, No 10, Oct 84).....	34
Polyfunctional Additives Based on Diethylenetriamine Alkenylsuccinimide (V.P. Yevstaf'yev, G.I. Shor, et al.; KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL, No 10, Oct 84).....	35
Rheological Properties of Oil Hydrocarbons (K.I. Zimina, A.M. Bezhanidze; KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL, No 10, Oct 84).....	35

#### POLYMERS AND POLYMERIZATION

Limiting Combustability Rates of Polymer Materials (V.N. Vorob'yev, L.V. Bychikhina, et al.; VYSOKOMOLEKULYARNYYE SOYEDINENIYA, No 10, Oct 84).....	36
Structure and Properties of Epoxyacrylate Resins (L.I. Martynyuk, L.I. Khmelenko, et al.; VYSOKOMOLEKULYARNYYE SOYEDINENIYA, No 10, Oct 84).....	36
Flow Birefringence and Conformational Characteristics of Polyamide Hydrazide in Dimethylsulfoxide (N.V. Pogodina, L.V. Starchenko, et al.; VYSOKOMOLEKULYARNYYE SOYEDINENIYA, No 10, Oct 84).....	37
Study of Cross-Linking Process of Linear Polystyrene During Reaction with 9,10-bis-(Chloromethyl)Anthracene (M.G. Krakovyak, T.D. Anan'yeva, et al.; VYSOKOMOLEKULYARNYYE SOYEDINENIYA, No 10, Oct 84).....	37
Diene Polymerization Catalysts Based on Titanium Halides and Complexes of Aluminum-Organic Compounds with Alkaline Earth Metal Alkyls (L.S. Bresler, K.V. Kisin, et al.; VYSOKOMOLEKULYARNYYE SOYEDINENIYA, No 10, Oct 84).....	38

Photoreactions of Primary Macroradicals During Mechanical Degradation of Silk Fibroin (K.M. L'vov, O.K. Gasymov, et al.; VYSOKOMOLEKULYARNYYE SOYEDINENIYA, No 10, Oct 84).....	38
Relationship of Acoustic Characteristics to Molecular Orientation and Strength of Chemical Fibers (B.Kh. Yunusov, M.P. Nosov; KHIMICHESKIYE VOLOKNA No 5, Sep-Oct 84).....	39
Study of Atmospheric and Light Resistance of Polypropylene Fibers and Films (V.P. Kolomytsyn, A.A. Yefimov, et al.; KHIMICHESKIYE VOLOKNA, No 5, Sep-Oct 84).....	39
Study of Parameters of Supramolecular Structure of Fluorine-Containing Monofilaments (A.V. Bezprozvannykh, B.N. Tarakanov, et al.; KHIMICHESKIYE VOLOKNA, No 5, Sep-Oct 84).....	40
New Stabilizers for Vinyl Monomers (M.D. Gol'dfeyn, L.A. Skripko, et al.; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNLOGIYA, No 9, Sep 84).....	40
Study of Effect of Cobalt and Copper Methacrylates on Copolymerization of Methacrylate with Methacrylic Acid (Ye.A. Gonyukh, Ye.V. Kuznetsov, et al.; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNLOGIYA, No 9, Sep 84).....	41
RADIATION CHEMISTRY	
Isotope Exchange Between Hexafluoride and Pentafluoride of Uranium (G.Yu. Grigor'yev, S.B. Dorofeyev, et al.; KHIMICHESKAYA FIZIKA, No 10, Oct 84).....	42
RUBBER AND ELASTOMERS	
Production of Ligno-Tallol Product LT-21 and Its Evaluation in Tire Rubber (B.D. Bogomolov, D.P. Yemel'yanov, et al.; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNLOGIYA, No 9, Sep 84).....	43
Study of Effectiveness of 5-Amino-1,2,3,4-Thiatiazole, a Pore Forming Agent for Rubbers Based on Aki-3NTP (T.Yu. Lyapina, G.A. Blokh, et al.; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNLOGIYA, No 9, Sep 84).....	43

## WATER TREATMENT

### Complex Schemes for Treatment of Electroplating Production Waste Water

(A.N. Belevtsev, P.F. Kandzas, et al.; VODOSNABZHENIYE  
I SANITARNAYA TEKHNIKA, No 10, Oct 84)..... 45

### Treating Waste Effluent from Lysine and Enterobacterin Production

(A.A. Bondarev, M.A. Pirogova, et al.; VODOSNABZHENIYE  
I SANITARNAYA TEKHNIKA, No 10, Oct 84)..... 46

## ADSORPTION

UDC 541.135.52.92-183

### ADSORPTION AND ABSORPTION OF OXYGEN ON PLATINUM AND EFFECT OF ELECTRODE SURFACE STATE ON SEPARATION OF THESE PROCESSES

Moscow ELEKTROKHIMIYA in Russian Vol 20, No 10, Oct 84  
(manuscript received 4 Feb 83) pp 1334-1339

GROMYKO, V.A. and VASIL'YEV, Yu.B., Institute of Electrochemistry, USSR Academy of Sciences, Moscow

[Abstract] Kinetics of the adsorption and absorption of oxygen on platinum in a wide range of potential values was studied along with the effect of the state of electrode surface on separation of these processes. It was observed that a complex interlocking of the adsorption and absorption processes of oxygen takes place. In principle, it was shown that with a potential  $E_r > 1.7$  V both adsorption and absorption of oxygen was observed always on platinum electrodes; however, due to the strong dependence of the second process on thermal treatment and on the state of platinum electrode, these processes could be separated and the adsorption of oxygen of platinum could be studied without interference of the absorption process. This separation of processes is related to the time of adsorption and the duration of the measuring impulse: the shorter they are, the easier it is to separate these processes. Figures 4; references 22: 9 Russian, 13 Western (2 by Russian authors).  
[44-7813]

UDC 667.287.5:541.183.02:541.128.1

### ADSORPTION PHTALOCYANINE CATALYSTS. SYNTHESIS, LAYER STRUCTURE AND CATALYTIC ACTIVITY

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA in Russian Vol 25, No 5, Sep-Oct 84 (manuscript received 25 Nov 83) pp 427-438

BORISENKOVA, S.A., Department of Chemistry Petroleum and Organic Catalysis

[Abstract] A systematic study of adsorption catalysts based on cobalt phthalocyanine (PcCo) was carried out. Characteristics of its adsorption on the surface of classical carriers such as silica gel,  $\gamma$ - $\text{Al}_2\text{O}_3$  and graphite is

described along with the structure of the layers of adsorbed  $\text{PcCo}$  as a function of the nature of adsorbed surface. Their catalytic activity in liquid phase oxidation and in reactions of isopropyl alcohol is described. Formation of monolayers with flat and inclined orientation of  $\text{PcCo}$  molecules is shown to take place. On oxide carriers, these monolayers consist of continuous linear associates while on carbon black they have a structure of the basic crystal face of  $\text{PcCo}$   $\beta$ -modification. The carbon black adsorbed agents appeared to be most promising candidates assuring formation of strong bonds with central metal ion or with the aromatic system of a ligand. Figures 4; references 17: 11 Russian, 6 Western. [60-7813]

UDC 541.183.03

CHANGE IN ADSORPTION PROPERTIES OF PLATINUM SURFACE AFTER ELECTRON BOMBARDMENT IN CARBON MONOXIDE

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 10, Oct 84  
(manuscript received 25 Mar 83) pp 2602-2604

KOSHCHYEV, A.P., Scientific-Research Physical-Chemical Institute imeni L.Ya. Karpov, Moscow

[Abstract] While studying products desorbed from the surfaces of metals under electron bombardment under vacuum, it has been observed that in some cases the composition of products obtained from surfaces precalcined under vacuum differed from those subjected to long term electron bombardment in a CO atmosphere. In the present work thermal stimulated desorption mass spectroscopy was used to study the effects of electron bombardment under CO on the surface of polycrystalline platinum. The bombardment is shown to result in a decrease in concentration of molecules in the adsorbed layer that is proportional to the CO pressure. Worsening of the surface properties is due to electron-stimulated dissociation of adsorbed CO molecules and the formation of carbon atoms on the surface. Figures 3; references 4: 2 Russian, 2 Western. [63-12765]

## ANALYTICAL CHEMISTRY

### ACADEMICIAN DISCUSSES SYNTHETIC COMPOUNDS

Leningrad LENINGRADSKAYA PRAVDA in Russian 17 Nov 84 p 2

[Interview by TASS Scientific Columnist V. Tarkhanovskiy of Academician N. M. Zhavoronkov, secretary of USSR Academy of Sciences Department of Physicochemistry and the Technology of Inorganic Materials: "'Second' Nature"]

[Text] Many probably remember the days when the inhabitants of Leningrad and guests of our city stood in enormous lines by the Hermitage to get the chance to see with their own eyes the rare beauty of articles from the tomb of Tutankhamen, the unique, one-of-a-kind treasures of Ancient Egypt. But not everyone knows that the chance to become familiar with them came about thanks to the achievements of science. Specifically, the achievements of chemical science.

The point is, the treasures of Tutankhamen's tomb were brought into our country in a specially created container, which not only is not subject to the influence of moisture and maintains a constant temperature and humidity inside, but also literally cannot burn in fire and cannot sink in water. This packaging was made for the unique exhibits by specialists who had at their disposal the glittering achievements of modern chemistry and materials technology.

The creation of new materials not existing in nature was the subject of conversation between TASS Scientific Columnist V. Tarkhanovskiy and Academician N. M. Zhavoronkov, secretary of the USSR Academy of Sciences Department of Physicochemistry and the Technology of Inorganic Materials.

[Question] Nikolay Mikhaylovich, where in everyday life does one run into the new materials created by scientists?

[Answer] Look carefully at the interior of your apartment: refrigerator, television, telephone, the furniture finish.... All this could not be made without the help of chemistry, which has literally come into our homes.

Or another example. Listening to the radio, a person never thinks about the fact that the radiotechnical industry could not exist without piezoelectric crystal. But the natural reserves of this mineral are extremely limited. A

way out of the difficult situation was found: hydrothermally growing piezoelectric crystal from solutions of large industrial monocrystals. The technological cycle here, under artificial conditions, takes a few days, while nature required (and requires) millions of years to grow such crystals.

Monocrystals are very important objects of today's technology. But in recent years, a wide variety of crystal ornaments have come into being as well. The All-Union Scientific-Research Institute for Synthesizing Mineral Raw Materials has even produced malachite by artificial means. The most successful samples of it can scarcely be distinguished from the natural.

[Question] And what sort of success have chemists had in the field of creating materials which nature has "never known" at all?

[Answer] We have learned how to produce a vast number of substances which do not exist in nature, sometimes having a very unexpected combination of properties. I will name some scientific-technical achievements which are already widely assimilated by industry or are standing at the threshold of plants and shops.

Substances have been synthesized which are needed to modulate a laser beam and manufacture the devices for computer on-line storage. New materials, not existing in nature, have been created based on glass with increased strength and thermostability--what are known as glass ceramics or microcrystalline glasses. The properties of ceramics are markedly improved, including fine ceramics, from which it is now even possible to produce articles by stamping.

Inorganic synthesis alone can in principle lead to the creation of a great number of compounds, most of which are not found in nature and which should rightly be considered synthetic--that is, products of the creative activity of the human mind and hands. Every year, chemists of the world synthesize an average of at least 50,000 compounds, including about 8,000 inorganic ones.

[Question] But, as before, the raw-materials base of the "second" nature is still the reserves of the depths of the earth, which in the final analysis are exhaustible....

[Answer] As for the raw-materials base: for example, instead of petroleum products, carbon monoxide and carbon dioxide will be used and are already being used, along with processed coal products, wood pulp, and shale. Our economy is now directed toward saving and making more rational use of all natural resources. And this can be done, in particular, by using the new materials synthesized by chemists. For example, what are known as filled polymers (in other words, stronger, improved), extra-strong chemical fibers, materials which are extra-resistant to corrosion, and also other materials with a predetermined set of useful properties.

The ever more actively adopted artificial materials are making it possible to save a great deal of expensive natural nonferrous metals, cotton, flax, and natural oils.

I will go into detail on one of the items on this list, the production and consumption of natural oils, which is interesting to everyone. In the framework of realizing the Food Program, chemists are faced with creating a substitute (one of equal value, of course) for a number of food products, but it is particularly necessary to find synthetic substitutes for the vegetable oils which are still found in large quantities in the production of varnishes and paints.

[Question] Some of the new materials are fairly expensive. What are the prospects for creating inexpensive and plentiful substitutes, for example, in radio electronics?

[Answer] In its time, the assimilation of transistor materials and phosphors, which everyone sees both in the shining hands of watches and on television screens, led directly to revolutionary changes in life and production. But many of these materials and similar ones are indeed expensive. And this obligates us to search for new materials, less expensive, but not inferior in properties. For example, the radio electronics industry is very interested in the future of materials obtained by synthesizing molecules which by themselves can function as individual conductors, resistors, capacitors, and so forth. The combination of these can lead to producing "molecular" amplifiers, storage locations in computers....

This direction, where the concepts "structure" and "function" seem to run together on the cellular level, promise a new revolution in the field of electronic minidevices which are very small in size but possess great capacity and speed. Their prototype is living organisms, in which electrical conduction is done by "perfectly matched" rows of electricity-conducting proteins within the cell.

[Question] Nikolay Mikhaylovich, I would like to know, what is the scale on which polymer materials have already been introduced?

[Answer] Carrying out the tasks set by the 26th Party Congress and subsequent CPSU Central Committee plenums, workers in sectors of the chemical complex have done a great deal. During the past years of the 11th Five-Year Plan, the use of chemical materials and products has increased by 40 percent in machine building, 50 percent in light industry, and 35 percent in agriculture. And in this sector, as in instrument building, 95 percent of all goods are produced using polymer materials.

For a more complete picture illustrating the goals and scale of the "second" nature we are creating, let me give a few more figures. Here's something we frequently hear about--chemization, one of the basic factors of increasing labor productivity and the effectiveness of production. But what lies behind this formula?

Calculations show that the "adoption" of 1 million tons of polymer materials to various fields of industry and agriculture make it possible to free 300,000 workers. The use of 0.5 million tons of polymer fibers frees 700,000 persons. Surprising figures, aren't they?

**BOOK: BASES FOR AUTOMATING ANALYTICAL CONTROL OF CHEMICAL INDUSTRIES**

Moscow OSNOVY AVTOMATIZATSII ANALITICHESKOGO KONTROLYA KHIMICHESKIKH  
PROIZVODSTV in Russian 1984 (signed to press 21 June 84) pp 2-6

[Annotation, table of contents and introduction from book by V.A. Prokhorov,  
"Bases for Automating Analytical Control of Chemical Industries", Izdatel'stvo  
"Khimiya", 6000 copies, 320 pages]

[Text] This book examines problems of automating analytical control of technical processes in chemical industries and shows fundamental sources of defects of various analysis methods and ways to remove them. It presents an evaluation of defects in analyses, which deals with the selection and transport of product test samples.

The book demonstrates the possibility of designing standard automated systems of analytical control.

It is intended for specialists in developing and utilizing automated analytical control systems and workers in metrological supervision of industrial enterprises of chemical, petrochemical and paper industries and light metallurgy. It is also useful for technical chemists and analytical chemists of scientific research institutes and design and industrial enterprises.

Table of Contents	Page
Foreword.....	5
Chapter 1. Automation of Analytical Control, Basic Concepts and Definitions.....	7
1.1. Industrial Agent, Determined Component, Measured Parameter.....	7
1.2. Automated Analytical Control Systems. Defects in Analysis Results.....	11
1.3. Methods for Measuring Composition of the Analyzed Agent.....	14
1.4. Sensitive Element of the Automatic Analyzer.....	15
1.5. Role of Departmental Metrological Supervision when Using Analytical Control Systems.....	17
Chapter 2. Methods for Analyzing Composition of Industrial Gases and Liquids. Characteristic Defects of Analyses and their Removal.....	18
2.1. Methods for Analyzing Composition of Industrial Gases and Vapors..	19
2.1.1. Thermal Conductometric Method.....	19
2.1.2. Thermomagnetic Method.....	26
2.1.3. Optical Absorption Method.....	28
2.1.4. Gasodynamic Method.....	33

2.1.5. Chromatographic Method.....	54
2.1.6. Moisture Content Analysis of Gases (Hygrometry).....	64
Coulomb Metric Hygrometry.....	65
Piezosorption Hygrometry.....	76
2.1.7. Operational Control of Quality of Gas-Analyzer Operation..	79
2.2. Methods for Analyzing Composition of Industrial Liquids, Suspensions and Emulsions.....	88
2.2.1. Potentiometric Method.....	88
2.2.2. Refractometric Method.....	105
2.2.3. Conductometric Method.....	108
2.2.4. Densimetric Method.....	115
Chapter 3. Transport of Industrial Agent to the Automatic Analyzer.....	128
3.1. Transport to Isothermal Conditions.....	128
3.2. Transport to Non-Isothermal Conditions.....	149
3.3. Filtration of Gases and Vapors from Aerosols.....	165
3.4. Filtration of Liquids from Mechanical Impurities.....	192
Chapter 4. Pressure Stabilization and Gas and Liquid Expenditure.....	213
4.1. Pressure Stabilization and Gas Expenditure.....	215
4.2. Pressure Stabilization and Liquid Expenditure.....	228
Chapter 5. Standard Automated Systems of Analytical Control of Industrial Agents.....	241
Appendix.....	253
Physical-Chemical Properties of Gases, Liquids and Solid Elements.....	253
Some Automatic Analyzers Used in Automated Analytical Control Systems in Chemical Industry.....	270
Elements for Formation of Gas Flows in Automated Analytical Control Systems.....	287
Elements for Formation of Flows in Automated Analytical Control Systems for Liquids.....	308
Bibliography.....	310
Index.....	313

## Foreword

The operational efficiency of industrial enterprises is rising for both industrial processes and processes which control them. The broad introduction of computer technology into automated control systems is opening up practically unlimited possibilities for processing information about the controlled object with the goal of designing optimum control systems. The actual realization of these possibilities, however, is essentially limited by nomenclature, technical parameters and reliability of automated analytical control systems.

Any automated analytical control system is a complex technological project, carried out on a small scale, but in which the same physical, chemical and thermotechnical processes occur as in industrial equipment. Therefore, in order to develop an automated analytical control system, we must first study the manufacturing process, and in particular establish physical and physical-chemical properties of the controlled industrial agent and its separate components, determine the interval of possible deviations in the composition of this agent, determine the completeness of reactions between components of the agent, etc.

Modern measuring technology can provide many measuring methods and equipment for carrying them out. In order to utilize this equipment successfully in conditions of complex chemical-industrial manufacturing, we need the knowledge and experience of operators of the corresponding equipment, the ability of technologists to foresee possible deviations in the composition of controlled mixture of products from the nominal and the knowledge of specialists in mathematical modeling of chemical-industrial processes.

Designers of automated analytical control systems often encounter difficulties when measuring one important parameter or another of the object, due to a conflict in the make-up of industrial controlled agents with the hypothetical composition of products for which measuring equipment being developed and produced has been adapted.

We should note that at many chemical enterprises, departmental metrological supervision services control the operation only of standard means of measuring technology, while basic sources of analysis defects are non-standard equipment, auxiliary structures for equipment and conditions of their utilization. Control over the correctness of the use of such structures, and also of the quality of information received with their aid must be carried out by departmental metrological supervision services.

Unfortunately, reports on automation of analytical control for various manufacturing processes are sprinkled throughout a few magazine articles and advertising pamphlets and of the most significant monographs, it is possible to name two: G. Formen, P. Stokuel. "Automatic Chemical Analysis". Trans. from Eng./under dir. of I.G. Abidov. M., MIR, 1978, 396 p. and V.P. Tkhorzhevskiy. "Automatic Analysis of Gases and Liquids at Chemical Enterprises". M., KHIMIYA, 1976, 272 p.

The first of these books deals with automation of laboratory analysis and the increase of work productivity of analytical chemists. V.P. Tkhorzhevskiy's book does not give enough attention to defects in analyses, which are linked to peculiarities of preparing and transporting the controlled industrial agent to the analyzer, and does not sufficiently reflect the experience of industrial utilization of automated analytical control systems.

Serving as a foundation of this book are the many years of this author's experience in developing and employing automated analytical control systems at enterprises of chlorine sectors of industry, which until recently was considered "unsuitable" for total automation of analytical control, due to

the fact that analyzed systems along with chemical complexity and diversity of compositions possess increased corrosive activity in relation to many construction materials. However, one should keep in mind that manufacturing processes in the chlorine industry encompass almost all standard tasks for analytical control automation.

While working on this book, I did not raise the question of familiarizing readers with one method or another of analytical control of industrial processes. Therefore, theoretical foundations of analytical control methods are examined briefly, in a volume necessary for analysis of a defect in received results and the search for ways to reduce that defect. In separate examples, several ways are shown to broaden the area of usage of automatic analyzers for solving problems of analytical control automation of industrial processes.

This book gives a great deal of attention to the selection and transport of controlling manufactured agents and analyzes possible changes in the composition of these agents during transporting and errors which occur. It also shows the possibility of designing standard automated analytical control systems and presents technical characteristics of elements, from which such systems can be assembled.

In conclusion, I would like to express my gratitude to editor A.P. Farmakovskiy for his many useful remarks which enabled me to improve the book, Ye.Ya. Neiman, V.Yu. Ryzhnev, D.K. Simonovskiy, T.B. Ovcharenko, P.Ye. Bochkov, R.F. Romm, Kh.N. Salakhov, G.I. Vasil'yev, Ya.B. Perel'shteyn, S.I. Chernyk and V.P. Shtan'ko for valuable advice and aid in writing and preparing the manuscript for publishing.

This author hopes that this book will be useful for workers of industrial enterprises, scientific research and design institutes of chemical, petrochemical and paper industry and light metallurgy, which specialize in the field of automation of analytical control and control-measuring instruments, and also chemical engineers and analytical chemists of industrial enterprises.

COPYRIGHT: Izdatel'stvo "Khimiya", 1984

12473

CSO: 1841/65

## DETERMINATION OF TRACE QUANTITIES OF URANIUM (IV) BY CHEMILUMINESCENCE METHOD

Leningrad RADIOKHIMIYA in Russian Vol 26, No 5, Sep-Oct 84

(manuscript received 10 Jun 83; in revised form 22 Mar 84) pp 652-656

YAKSHIN, V.V. and KHOKHLOVA, N.L.

[Abstract] The chemiluminescence of the reaction between uranium disulfate and xenon difluoride was studied by mixing aqueous solutions in a photo cell; total light emission was measured by graphic integration of the intensity-time curve. Throughout the course of the reaction, the spectrum corresponded with the uranyl emission spectrum, indicating the luminescence was caused by transfer of reaction energy to uranyl ion formed during the course of the reaction, a proposition confirmed by the lack of effect of the addition of extra uranyl ions. The intensity of the luminescence and total light output varied directly with the concentrations of both the reacting compounds. Intensity increased rapidly after mixing, then fell exponentially after several minutes, indicating a multistage reaction. Measurements of total light output indicated optimum concentration of the xenon fluoride is in range  $10^{-3}$  to  $10^{-4}$  mol/l. The reaction was judged suitable for analytical applications. Figures 4; references 7 (Russian). [85-12672]

## STUDY OF DIRECT ACID PROCESSING OF PHOSPHATE ORE FROM TELEKSK DEPOSITS

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHOLOGIYA in Russian Vol 27, No 9, Sep 84 (manuscript received 10 Oct 82) pp 1051-1054

PANOV, V.P., CHULKOVA, E.N., CHEKRENEVA, G.M. and TERESHCHENKO, L.Ya., Department of Chemical Manufacturing Processes and Equipment, Leningrad Institute of Textile and Light Industry imeni S.M. Kirov

[Abstract] Increasing demands for phosphate fertilizers and limited resources of high quality crude necessitated development of new processing methods which could be used with poor quality phosphate ores such as could be obtained from the Teleksk deposits. The composition of the ore was as follows:  $P_2O_5$ --13.9%,  $R_2O_3$ --5.9%,  $Al_2O_3$ --6.3%,  $CaO+MgO$ --22.6% and insoluble residue--43.5%. Direct acid breakdown of this ore led to extraction of phosphoric acid (EPA) with a 20%  $P_2O_5$  content. Elevation of the temperature from 30 to 70°C led to an increased coefficient of ore decomposition from 2 to 7%. The pulp was sedimented and then the condensed suspension was centrifuged at 67-83 rps [sic]. Polyacrylamide was used effectively as a flocculant to intensify the sedimentation process. Figures 2; references 5 (Russian). [61-7813]

## DESTRUCTION OF SULFUR-CONTAINING ORGANIC SUBSTANCES IN AMMONIACAL PLASMA OF HIGH ENERGY DISCHARGE

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA in Russian Vol 25, No 5, Sep-Oct 84 (manuscript received 14 Jul 83) pp 471-472

VOLODINA, M.A., ARUTYUNOVA, A.S. and MEDINA MANSILIA TOMAS, Department of Organic Chemistry

[Abstract] An attempt was made to use low temperature ammoniacal plasma in quantitative determination of sulfur in organic compounds with reduced sulfur functions: thioamides, sulfides, mercaptans etc. Analysis of the data showed that a 5-minute exposure to ammoniacal plasma at a temperature inside the reactor below 100° led to quantitative liberation of sulfur followed by absorption of sulfide ions with NaOH on porolone. Final determination of sulfide ions was done by titration with cadmium acetate using dithizone as an indicator.

References 2: 1 Russian, 1 Western.  
[60-7813]

UDC 541.14 + 546.214

## PHOTOLYSIS OF OZONE AND OZONE-HYDROGEN MIXTURES IN SHAPPOI BAND REGION

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA in Russian Vol 25, No 5, Sep-Oct 84 (manuscript received 27 Feb 84) pp 445-450

TKACHENKO, S.N., POPOVICH, M.P., YEGOROVA, G.V. and FILIPPOV, Yu.V., Department of Physical Chemistry

[Abstract] Quantum yield of ozone breakdown resulting from the action of red laser beam ( $\lambda = 632.8$ ) was measured in pure ozone and in mixtures of ozone with helium, sulfur hexafluoride and hydrogen. It was shown that the quantum yield of ozone breakdown was established in the first 2.5-5.0 min of each experiment regardless of pressure. For the pure ozone the yield was  $2.3 \pm 0.2$  molecule/quantum. In mixtures with hydrogen an increased quantum yield was observed with increased hydrogen content in the mixture. Possible mechanisms for the observed processes were proposed. Figures 3; references 23: 8 Russian (1 by Western authors), 15 Western.

[60-7813]

UDC 541.128:541.49:546.73:547.288.4:542.943.7:547.9

COMPLEXES OF COBALT (III) WITH OXIME DERIVATIVES AS CATALYSTS OF ELECTRON  
TRANSPORT FROM COMPONENTS OF RESPIRATORY CHAIN

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 10,  
Oct 84 (manuscript received 25 Apr 83) pp 2185-2191

NOVODAROVA, G.N., KISELEVA, L.L., TUVIN, M.Yu., STETSENKO, A.I., SHAROVA, L.P.  
and VOL'PIN M.Ye., Institute of Heteroorganic Compounds imeni A.N. Nesmeyanov,  
USSR Academy of Sciences, Moscow; Leningrad Chemico-pharmaceutical Institute

[Abstract] Chelate complexes of cobalt III were formed with  $\alpha$ -aminooximes,  $\alpha$ -hydroxylaminooximes, and  $\alpha$ -nitrosooximes. Their catalytic effect on the oxidation of various quinones was measured. It was negligible for the nitrosooxime complexes and strongest for the hydroxylaminooxime complexes, apparently due to an ability to form coordination bonds with oxygen. Except for the aminooxime complexes, many of these compounds also activated the respiration of intact mitochondria from rat-liver cells. Generally, the active compounds did not change the reaction speed when adenosine diphosphate was added, indicating the mechanism is a disconnection of respiration from oxidative phosphorylation in the mitochondrial membrane. References 12: 6 Russian, 6 Western.  
[62-12672]

EFFECT OF CARBON CARRIER NATURE ON ELECTROCATALYTIC PROPERTIES OF Rh/C ELECTRODES

Moscow ELEKTROKHIMIYA in Russian Vol 20, No 10, Oct 84

(manuscript received 26 Nov 82, after revision 14 Jul 83) pp 1364-1366

ZAKUMBAYEVA, G.D., BEKETAYEVA, L.A., AZERBAYEVA, Z.I., KUANYSHEV, A.Sh. and FRIDMAN, L.I., Institute of Organic Catalysis and Electrochemistry, KaSSR Academy of Sciences, Alma-Ata

[Abstract] Potentiometric, IR-spectroscopic, electron-microscopic and x-ray structural methods were used to study the effect of the nature of the carbon carrier on electrocatalytic properties of 5% Rh/C electrodes. Carbon texture appears to have a highly distorted and unordered structure with hexagonal network. Evlon and mtylon possess nitrogenous fragments in addition to carbon. When Rh is deposited on uglem, its IR spectrum remains unchanged while the spectra of eolon and mtylon show definite shifts in the area of nitrogen bonds. The Rh particle size deposited on the electrode can be controlled by its temperature of reduction; when raised from 473 to 773 K, the particle size increases and only the Rh(III) edge remain open to hydrogen adsorption. According to electron-microscopic data, highly dispersed rhodium is formed on uglem, free of nitrogen containing structures; the Rh-evlon and Rh-mtylon electrodes have larger Rh particles. Variation of the dispersiveness and the nature of the carrier makes it possible to select various reaction conditions. Figures 2; references 2 (Russian).  
[44-7813]

## STUDY OF CHANGES IN COMPOSITION OF ADSORBED LAYER LEADING TO DEACTIVATION OF CATALYST

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHOLOGIYA in Russian Vol 27, No 9, Sep 84 (manuscript received 20 Dec 82) pp 1046-1050

BATENIVA, Z.G., SOKOL'SKIY, D.V., ZHANABAYEV, B.Zh. and KUCHAPINA, L.G., Problem Laboratory, Kazakh Chemical-Technologic Institute

[Abstract] Introduction of samarium oxide into rhodium black reduces the level of benzene hydrogenation over this catalyst by 2.5-3 fold. Using the method of thermodesorption (TD), the characteristics of pure rhodium black and its mixture with  $\text{Sm}_2\text{O}_3$  were investigated. The deactivation of Rh catalysts during hydrogenation of benzene was accompanied by accumulation of carbon atoms on its surface. The adsorption occurred on active centers from which these atoms could be desorbed in form of weakly-bound compounds with CO. The content of hydrogen in TD products increased 2-3 fold with the Rh- $\text{Sm}_2\text{O}_3$  catalyst; no substantive changes were noted in the TD kinetic curves of  $\text{CO}_2$ . The most significant difference in behavior of these catalysts were found in the desorption kinetics of methane and CO. Rh black showed a relatively lower content of  $\text{H}_2$  atoms in the TD products than the Sm promoted catalyst. The ratios of H/C and H/O in the Rh- $\text{Sm}_2\text{O}_3$  catalyst changed symbatically with the change in the amount of hydrogenated benzene, while the opposite is observed with Pd black. Figures 4; references 6: 5 Russian, 1 Western. [61-7813]

UDC 542.85:541.128

## STUDY OF RANEY NICKEL CATALYSTS BY GAMMA-RESONANCE SPECTROSCOPY

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 10, Oct 84 (manuscript received 23 Dec 82) pp 2459-2461

KHLYSTOV, A.S. and FASMAN, A.B., Institute of Organic Catalysis and Electrochemistry, Kaz SSR Academy of Sciences, Alma-Ata

[Abstract] Skeletal catalysts based on Group VIII metals are widely used in liquid phase hydrogenation and they are also important electrode components in low temperature fuel cells used to convert chemical energy directly into electricity. The properties of these catalysts are a complex function of many parameters such as method of preparation, quantity and form of sorbed hydrogen, presence of modifiers, etc. In the present work the properties of Raney nickel catalysts made from  $\text{Ni}_2\text{Al}_3(\text{Fe}^{57})$  and  $\text{NiAl}_3(\text{Fe}^{57})$  alloys as functions of temperature and duration of leaching were studied by gamma-resonance spectroscopy. Figure 1; references 7: 4 Russian, 3 Western. [63-12765]

CATALYTIC ACTIVITY IN HYDROGENATION REACTIONS OF Pd METAL COMPLEXES FIXED ON SILICA GELS MODIFIED BY TERTIARY AMINES AND QUATERNARY AMMONIUM BASES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 10, Oct 84 (manuscript received 13 Jan 84) pp 2384-2386

SHARF, V.Z., NESTEROV, M.A., FINN, L.P. and SLINYAKOVA, I.B., Institute of Organic Chemistry imeni N.D. Zelinskiy, USSR Academy of Sciences, Moscow; Institute of Physical Chemistry imeni L.V. Pisarzhevskiy, UkSSR Academy of Sciences, Kiev

[Abstract] Silica gels containing  $\gamma$ -chloropropyl radicals were modified with pyridine, triethylamine, diethylamine, and piperidine. Silica gels were also modified with aminomethyl- and aminopropyltriethoxy silane and monochloroacetic acid. The modified gels were then treated with  $\text{NaPdCl}_4$  in methanol and used to catalyze the hydrogenation and isomerization of allylbenzene. Silica gel modified with  $\gamma$ -propylaminodiacetate groups showed the highest activity. The addition of thiophene consistently lowered the hydrogenation rates and generally also isomerization rates, though not for the pyridine-modified silica gel. Figures 2; references 6: 1 Czech, 4 Russian, 1 Western.  
[62-12672]

SECONDARY REACTIONS DURING INFRARED MULTIPHOTON DISSOCIATION OF  $\text{CF}_3\text{I}$  MOLECULES

Moscow *KHIMICHESKAYA FIZIKA* in Russian Vol 3, No 10, Oct 84  
(manuscript received 8 Jul 83) pp 1386-1391

BAGRATASHVILI, V.N., BURIMOV, V.N., DEYEV, L.Ye., NOSKOV, V.I. and SVIRIDOV, A.P., Scientific-Research Center for Laser Technology, Troitsk, USSR Academy of Sciences

[Abstract] Multiphoton excitation of molecules by infrared laser pulses is a simple and effective means for initiating gas phase reactions. Initial, intermediate and end reaction products can have significantly different temperatures as a result of intermolecular selectivity and high excitation velocities. Such conditions may be readily achieved at low gas pressures where there is little molecular collision and dissociation. This results in greater formation of some single end product and less formation of side products. In the present work suppression of bimolecular reactions of radicals with initial products as a possible cause for decreasing the number of reaction routes was studied using  $\text{CF}_3\text{I}$  molecules as an example. Infrared multiphoton induced dissociation of  $\text{CH}_3\text{I}$  molecules at low pressure, i.e., approaching non-collision conditions, results in end product formation by radical-radical reactions. Under colliding conditions at higher temperatures, end products are formed by radical-molecular reactions. In both cases the end product was  $\text{C}_2\text{F}_6$  which is thermally more stable than  $\text{CF}_3\text{I}$ . Figure 1; references 12: 5 Russian, 7 Western (2 by Russians--Bagratashvili et al)  
[45-12765]

## ELECTROCHEMISTRY

### STRUCTURE AND APPLICATIONS OF NEW SOLID ELECTROLYTES

Moscow ZNANIYE-SILA in Russian No 10, Oct 84 p 3

[Interview with Doctor of Chemical Sciences Yuriy Yakovlevich Gurevich, staff member of the Institute of Electrochemistry imeni A.N. Frumkin, of the USSR Academy of Sciences. (date, place and occasion not given) under the rubric: "Science Courier": "An Ionister Instead of a Battery"]

[Text] Soviet researchers have created capacitors of unprecedented capacitance. They are based on solid electrolytes, materials which combine the properties of both liquids and crystals. We learn more about these devices from Doctor of Chemical Sciences Yuriy Yakovlevich Gurevich, staff member of the Institute of Electrochemistry imeni A.N. Frumkin, of the USSR Academy of Sciences.

[Question] Recently there has been a sharp increase in the amount of research related to solid electrolytes. How do you explain such great interest in these materials?

[Answer] The explanation lies primarily in the achievements of physics and chemistry, in particular electrochemistry and solid state physics, and in the advances of experimental technology, which make it possible to conduct highly refined experiments. Finally, there are the demands of contemporary technology and production. Solid electrolytes can and already do find extra-ordinarily effective application in the power industry, in computer technology, in instrument building, metallurgy and medicine.

[Question] So, a solid electrolyte is a solid body with ionic conductivity due to elements melted or dissolved in it. Why does it have such properties?

[Answer] The explanation is based on the unusual structure of the new materials. Recall that the crystal lattice of metals is made up of positively charged ions, that is, atoms which are missing one or more electrons, which these atoms have, so to speak, given up for general use. The ions are held firmly in their places and are incapable of leaving them, while the electrons, having deserted their masters can wander freely about the crystal, which gives them their name of "free electrons." The number of electrons is enormous--there are about  $10^{22}$  of them in one cubic centimeter. These electrons provide the high electrical conductivity of metals. In contrast the crystal lattice of ordinary nonmetallic materials is usually made up of both positive and negative ions.

There are no free electrons and the ions are nearly immobile, so that the majority of ionic crystals are excellent insulators at room temperature. Solid electrolytes are hybrids in which some ions form a stable skeleton, providing the crystal with elasticity and rigidity, while others are in a "liquid" phase.

I can give an example of a specific device in which solid electrolytes are already used. Electrochemical capacitors are already being constructed with an enormous, I would say unprecedented, capacitance. These are the so-called ionisters. In an ordinary capacitor, the plates are separated by thin layers of material. In an ionister there is no need for any. This explains its fantastic capacitance, since one ionister can replace a series of ordinary capacitors many kilometers long.

The fantastic capacitance of this new type of capacitor is making possible further miniaturization in electrical engineering, radio engineering and electronics. A variety of pickups sensing elements constructed--using solid electrolytes--for temperature, mechanical loads, and chemical composition of the environment. These sensing elements put out an electrical signal, and can thus be used to advantage in automatic systems for the control of chemical processes. Solid electrolytes are being used increasingly more widely in the power industry to construct electric batteries and storage cells, lighter and more compact than those currently in use. The future of motor vehicle transport may depend on these batteries.

COPYRIGHT: "Znaniye-sila", 1984

9832

CSO: 1841/83

## CATALYSTS USED FOR SYNTHESIZING AMINES

Minsk SOVETSKAYA BELORUSSIYA in Russian 26 Oct 84 p 2

[Article by Ya. Paushkin, academician of the BSSR Academy of Sciences: "From Theory to Practice"]

[Text] Over the past 150 years, science and technology have made widespread use of a remarkable chemical phenomenon, catalysis. The essence of the phenomenon is that certain substances, the catalysts, are capable of accelerating particular chemical reactions hundreds of thousands of times. In addition, many chemical reactions, for example, the synthesis of ammonium from nitrogen and hydrogen, are practically impossible without a catalyst. The specific action of a catalyst consists in its ability to retain a high level of activity over a long period of time and to chemically alter a quantity of material much greater than the weight of the catalyst itself. For example, one kilogram of aluminum-platinum catalyst used at the Polotsk and Mozyrsk petroleum refining plants, can process up to 70,000 kg of petroleum products during its time of use. This is why catalysts are widely used at the major enterprises of our republic-platinum, iron and copper at the Azot Production Association in Grodno, cobalt at the Khimvolokno plant in Mogilev, and palladium at the Novopolotsk chemical combine.

Catalysis plays a particularly important role in organic chemistry, since organic compounds, because of their low polarity, have a very low reaction rate. Catalysts have been used to achieve outstanding successes in the technology of synthesizing such important organic compounds as synthetic rubber, polyethylene, capron, lavsan, nitron, synthetic fuel, high-octane gasoline, etc. In connection with this, research on catalysis, aimed at clarifying the essence of the action and searching for active catalysts for existing and for as yet unfamiliar reactions, is of great scientific and practical significance.

Notable progress in this areas has been made by scientists at the Institute of Physico-organic Chemistry of the BSSR Academy of Sciences, who have developed new catalytic methods for synthesizing nitrogen-containing organic compounds. They have established the fundamental laws of transformation of a number of nitrogenous organic compounds under conditions of catalysis. They have developed highly efficient and available copper-nickel catalysts for a new method for the catalytic hydroamination of alcohols, aldehydes and ketones by nitriles and oximes. This reaction can be used to synthesize amines of various compositions and structures.

Amines serve as structural elements of important naturally-occurring compounds. They are widely used in the national economy as starting materials for the synthesis of drugs, chemicals used for protecting agricultural crops from diseases and pests, polymer stabilizers, resins, petroleum products, etc. Currently available methods for synthesizing amines cannot, however, meet the demands of production, so that the development of new methods for synthesizing these compounds is an important task for the national economy.

The results obtained are of great practical significance. The amines synthesized have been used in the production of a number of effective biologically-active compounds. These include compounds capable of lowering arterial pressure, as well as antidiabetic and antiviral drugs and a variety of pesticides. Amines have been used in the synthesis of a large number of different surface-active substances with antistatic properties.

The widespread use of polymeric materials in technology and daily life has led to the problem of static electricity. A static charge can cause great difficulties in the production and utilization of many products. A study of the relation between the chemical structure of compounds and their antistatic effect has led to the synthesis of highly effective antistatic agents which have already found application at more than 15 enterprises of the electrical measurement, optical and electronics industries. All of this is confirmation that the research of Academicians of the BSSR Academy of Sciences N.S. Kozlov, L.V. Gladkih, K.A. Zhavnerko, S.I. Kozintsev, V.A. Serzhanina, and V.A. Tarasevich on the "Development of New Catalytic Methods for the Synthesis of Nitrogen-containing Organic Compounds" has made a perceptible contribution to solving a number of problems of great importance to the national economy.

9832

CSO: 1841/83

UDC 541.127:541.515:541.15:547.593.2

REACTION KINETICS OF RADICALS FORMED BY PULSED ELECTRON IRRADIATION OF  
CYCLIC ALCOHOLS IN LIQUID PHASE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 10,  
Oct 84 (manuscript received 14 Jul 83) pp 2194-2198

LADYGIN, B.Ya., ZIMINA, G.M. and REVINA, A.A., Institute of Electrochemistry,  
USSR Academy of Sciences, Moscow; State Scientific Research and Planning  
Institute of Nitrogen Industry and of Products of Organic Synthesis, Moscow

[Abstract] Highly purified liquid cyclohexanol (26-150°C) and cyclododecanol (80-135°C) were purged with neon to remove oxygen and irradiated with 10 MeV pulses of 1.5  $\mu$ s duration in a 3.5 cm cylindrical quartz reaction cell. Light absorption bands of the resulting  $\alpha$ -oxycycloalkyl radicals peaked at 280 and 300 nm wavelengths respectively. Coefficients of extinction for both were 800 l-mole/cm, significantly different from earlier published values, possibly due to higher sample purity. The logarithm of the reaction constant for the loss of the free radicals varied linearly with temperature. The reaction rate was limited not by diffusion, but by the speed of chemical interaction of the radicals. Figures 2; references 7: 4 Russian, 3 Western.  
[62-12672]

UDC 541.195.5

POTENTIODYNAMIC MEASUREMENTS ON SEMICONDUCTOR ELECTRODES. INDIUM ANTIMONATE

Moscow ELEKTROKHIMIYA in Russian Vol 20, No 10, Oct 84  
(manuscript received 22 Feb 83) pp 1346-1352

ROMANOV, O.V. and SOKOLOV, M.A., Leningrad State University imeni A.A. Zhdanov

[Abstract] Electrochemical and electrophysical properties of InSb electrodes were investigated by the method of complex field effects in aqueous electrolytes with different pH and potentiodynamic as well as potentiostatic conditions. The initial state of the InSb electrode surface in presence of

ultrathin oxide was described addressing the characteristics of the filling (degeneration of electron-gap gas in the "C" and "V" zones) and distribution (nonparabolicity of the "C" zone) of electronic states of resolved zones of the semiconductors. Introduction of heavy metal impurities (Cu, Pt, Au) into the neutral electrolyte results in a shift of the electrode potential towards the anode zone along with a change of the volt-faraday characteristics. Comparison of their redox potentials led to an assumption of autoisolation of Cu, Au and Pt additives on the surface of InSb electrode. It was established that chemical composition of the InSb electrode surface as well as the structural-chemical anisotropy along with [211] direction in InSb manifest themselves in different electrochemical and electrophysical properties of the InSb-electrolyte system. Figures 6; references 26: 14 Russian, 12 Western (2 by Russian authors).  
[44-7813]

UDC 541.138

#### HIGH TEMPERATURE GAS CO-ELECTRODE FROM PLATINUM IN FUSED SILICATE

Moscow ELEKTROKHIMIYA in Russian Vol 20, No 10, Oct 84  
(manuscript received 1 Mar 83, after revision 1 Nov 83) pp 1373-1374

KUKHTIN, B.A. and PODGORNOVA, G.A., Vladimir Polytechnic Institute

[Abstract] Electrochemical reaction of CO in contact with fused silicate represents one of the stages of indirect reduction of ferrous and non-ferrous metals during the process of pyrometallurgic treatment of the crude. It was shown to be possible to obtain and study regularities of the behavior of CO electrode from platinum partially immersed in fused sodium silicate. Introduction of CO into the electrode cell resulted in a rapid shift of the potential to a given constant value. The polarization values decreased as the electrode was immersed deeper into the fused material. It was shown that the electrochemical reaction occurred not only at the interphase edge of electrode/fused silica/gas, but along the entire surface of platinum electrode in the fused silica as well. Figures 3; references 3: 3 Russian, 1 Western.  
[44-7813]

## ELECTROCHEMICAL PROPERTIES OF ANODE BISMUTH OXIDE FILMS. CAPACITY MEASUREMENTS

Moscow ELEKTROKHIMIYA in Russian Vol 20, No 10, Oct 84  
(manuscript received 24 Jun 83) pp 1393-1395

POZNYAK, S.K. and KULAK, A.I., Scientific Research Institute of Physical-Chemical Problems, Belorussian State University imeni V.I. Lenin, Minsk

[Abstract] Structure characteristics of the areas of space charge of  $\text{Bi}_2\text{O}_3$  electrodes (ASC) were studied along with the dynamics of ASC determination during electrode potential change. The results showed that both the heated and non-heated  $\text{Bi}_2\text{O}_3$  films exhibited the ability to increase concentration of current carriers in ASC upon switching on the electric field. Calculated values of  $N_d$  in  $\text{Bi}_2\text{O}_3$  under large anode potentials (above +0.5V) are very large (of the order of  $10^{20} \text{ cm}^{-3}$ ), exceeding the concentration of free electrons in metallic Bi. Further studies are needed to evaluate this phenomenon. Figures 3; references 11: 2 Russian, 9 Western (1 by Russian authors). [44-7813]

UDC 535.215;541.13;541.147;771.534.21

## PHOTOEFFECT SENSITIZATION WITH DYES OF FERROELECTRICS-SEMICONDUCTORS

Moscow ELEKTROKHIMIYA in Russian Vol 20, No 10, Oct 84  
(manuscript received 11 Aug 83) pp 1399-1401

AKIMOV, I.A., State Optical Institute imeni S.I. Vavilov, Leningrad

[Abstract] An attempt was made to induce photoelectric sensitivity in titanates and niobates in the visible region of the spectrum. Pure material showed a sharp drop of the photoelectric sensitivity above 400 nm with a weak tail in the long wave region. When sensitized with organic dyes, they exhibited new intensive bands resulting from the superimposition of the dye bands. Some of these sensitized semiconductors tended to lose their photosensitivity rather rapidly (those dyed with polymethine or triphenylmethane dyes): the xanthene type dyes such as bengal rose, eosine or erythrosine were not desensitized. Figure 1; references 15: 9 Russian, 6 Western. [44-7813]

## SOLAR ENERGY CONVERSION IN SULFURIC ACID ANHYDRIDE AND WATER CONVERSION REACTIONS IN MOLECULAR PHOTOCATALYTIC SYSTEM

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 10, Oct 84  
(manuscript received 23 Dec 82) pp 2555-2558

PARMON, V.N., SAVINOV, Ye.N. and SAIDKHANOV, S.S., Institute of Catalysis, Siberian Department, USSR Academy of Sciences, Novosibirsk; Andizhan Pedagogical Institute

[Abstract] Recent advances in photocatalytic systems to derive hydrogen by decomposition of water have been successful. Other photocatalytic processes in which hydrogen is obtained from water by oxidation of some specially selected electron donor, instead of water, should also be successful. In the present work it is shown that sulfuric acid anhydride may serve as such an electron donor in the reaction:  $\text{H}_2\text{O} + \text{SO}_3^{-2} \xrightarrow{\text{h}\nu} \text{H}_2 + \text{SO}_4^{-2}$  conducted as a photocatalytic system. The possibilities of employing this and similar reactions to transform and convert solar energy into chemical energy as hydrogen fuel is discussed. Figure 1; references 15: 9 Russian, 6 Western. [63-12765]

UDC 533.924;541.1

STUDY OF KINETICS OF RADICAL ACCUMULATION DURING PHOTOLYSIS OF  
POLYTETRAFLUOROETHYLENE WITH LIGHT AT 147 AND 123.6 NM

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 3, No 10, Oct 84  
(manuscript received 25 Aug 83) pp 1405-1408

BAYDAROVTSSEV, Yu.P., VASILETS, V.N., DOROFYEV, Yu.I., PONOMAREV, A.N. and  
SKURAT, V.Ye., Department of Institute of Chemical Physics, USSR Academy  
of Sciences, Chernogolovka

[Abstract] A study was made of the kinetics of radical accumulation, quantum yields and the process of vacuum UV etching of polytetrafluoroethylene at 147 and 123.6 nm with xenon and krypton lamps, respectively. The kinetics of radical accumulation was found to conform to a previously derived equation correlating light intensity, absorption coefficient, linear velocity of etching and quantum yield. At 147 and 123.6 nm the quantum yields of fluoroalkyl radicals were  $(3 \pm 1) \cdot 10^{-3}$  and  $(6 \pm 1) \cdot 10^{-3}$ , respectively. Etching velocity increases as the wavelength is decreased from 147 to 123.6 nm. Lowering sample temperature from 300 to 77°K showed no change in radical yield and a drop in etching velocity. Figures 3; references 8: 6 Russian, 2 Western. [45-12765]

UDC 541.8.1.11

THERMODYNAMIC STUDY OF NaBr, NH<sub>4</sub>Br, KBr AND ND<sub>4</sub>Br SOLUTIONS IN WATER AND HEAVY WATER MIXTURES WITH N,N-DIMETHYLFORMAMIDE

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 27, No 9, Sep 84 (manuscript received 17 Sep 80) pp 1111-1113

TOROPOV, V.V., KOROLEV, V.P. and KRESTOV, G.A., Division #1, Institute of the Chemistry of Nonaqueous Solutions, USSR Academy of Sciences

[Abstract] Enthalpy changes (kJ/mole) were determined for solutions of NaBr, KBr, NH<sub>4</sub>Br and ND<sub>4</sub>Br in H<sub>2</sub>O, D<sub>2</sub>O-DMF mixtures at 298 K and tabulated. It was shown that for all these electrolytes enthalpy of solution decreased gradually with increasing content of DMF in H<sub>2</sub>O or D<sub>2</sub>O, indicating increasing solvation of the stoichiometric mixture of the ions. Going from a mixture of H<sub>2</sub>O-DMF to D<sub>2</sub>O-DMF the solvation of K<sup>+</sup> and Br<sup>-</sup> ions decreased, while that of the NH<sub>4</sub><sup>+</sup> increased. Figure 1; references 12: 11 Russian, 1 Western. [61-7813]

UDC 546.841.4+791.4

THERMAL DECOMPOSITION OF THORIUM AND URANIUM (IV) CHLOROACETATES

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA in Russian Vol 25, No 5, Sep-Oct 84 (manuscript received 2 Jun 83) pp 455-458

MATVEYEV, Yu.S. and DUNAYEVA, K.M., Department of Inorganic Chemistry

[Abstract] Thermal decomposition of a series of uranyl and thorium mono-, di- and trichloroacetates was studied by IR spectroscopy, x-ray analysis and by derivatographic methods. The decomposition of analogous U and Th chloroacetates was entirely identical down to the distribution and shape of the DTA and DTG curves. In an inert atmosphere all compounds decomposed in a single phase; replacement of the inert phase with air led to the appearance of a second phase. Analysis of experimental and literature data led to a conclusion that these chloroacetates break down concurrently in several directions. References 21: 12 Russian (2 by Western authors), 9 Western (2 by Russian authors). [60-7813]

## REACTION OF SILICON AND TITANIUM WITH ALUMINUM

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA in Russian Vol 25, No 5, Sep-Oct 84 (manuscript received 30 Jun 83) pp 500-503

ORYNBEKOV, S.B., MAKANOV, U.M., GUZEY, L.S. and SOKOLOVSKAYA, Ye.M.,  
Department of General Chemistry

[Abstract] The goal of this study was to determine the borders of solid solutions in the system aluminum-titanium and aluminum-silicon-titanium (up to the concentration of 0.5% Si and 0.4% Ti) using x-ray and microscopic methods of analysis. It was established that at 770K the solubility of titanium in aluminum is 0.22%; in the ternary system, along the 0.25% silicon slice it was 0.14% Ti and on the 0.5% Si slice it was 0.088% Ti. Analysis of the relationship between the alloy composition and its electrochemical characteristics based on determination of polarization curves showed that increased stationary and break-through potentials occurred in both systems studied only up to the concentration corresponding to maximum solubility of titanium and aluminum. Figures 3; references 13: 4 Russian (1 by Western author), 9 Western.  
[60-7813]

UDC 546.261

## POSSIBILITIES OF FORMING GRAPHITE INCLUSION COMPOUNDS WITH VARIOUS METALS

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA in Russian Vol 25, No 5, Sep-Oct 84 (manuscript received 13 Jun 83) pp 506-509

SEMENENKO, K.N., AVDEYEV, V.V. and MORDKOVICH, V.Z., Department of Physics and Chemistry of High Pressures

[Abstract] Many metals are capable of forming inclusion compounds with graphite (GIC) in which metal layers are interspersed with graphite network. An attempt was made to find a correlation between the ability of a metal to form GIC and its principal physical properties. The four factors determining the ability of a metal to form GIC are: atomization energy, ionization potential, contractibility and metallic radius. Four groups of metals were identified by their relationship to graphite: K, Rb, Cs and Li which could react with graphite already at 100-200°C, forming C<sub>8</sub>M type GIC's; Na, Ba, Eu and Yb forming C<sub>64</sub>Na at 400°C and Ba, Eu and Yb yielding C<sub>6</sub>M at 400-500°C and high vacuum; Ca, Sr and the lanthanides (with exception of Eu and Yb) which form GIC with difficulty or not at all; and the remaining elements with which so far it was impossible to get any GIC's. An empirical equation was developed on the basis of above factors capable of predicting whether a given metal could form GIC. References 16: 3 Russian (1 by Western author), 13 Western.  
[60-7813]

## REACTION OF Mg-Ca-Ce SYSTEM ALLOYS WITH HYDROGEN

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA in Russian Vol 25, No 5, Sep-Oct 84 (manuscript received 1 Apr 83) pp 509-512

SEMENENKO, K.N., VERBETSKIY, V.N. and SYTNIKOV, A.N., Department of Physics and Chemistry of High Pressures

[Abstract] Hydrogenolysis of intermetallic magnesium compounds accompanied by formation of magnesium hydride is of great importance and practical interest. Reaction of magnesium alloys of the Mg-Ca-Ce system with hydrogen was studied at the  $Mg_2Ca$ - $CeMg_{12}$  plane. In the magnesium corner phase composition of these alloys is characterized by a combination of these phases:  $CeMg_{12}$ ,  $Mg_2Ca$  and Mg; no ternary compounds were found. Initial absorption rates for hydrogen are rather high, exceeding the values observed for pure magnesium. At a later stage, when the content of Ca and Ce increased, the level of total and reversibly sorbed hydrogen was decreased because of the lower content of Mg in the alloy. Temperature decreases resulted in lower interaction between the test samples and hydrogen. Thus the catalytic effect of Ca and Ce was shown to be in effect. Figures 2; references 5: 2 Russian, 3 Western. [60-7813]

UDC 547.1'13.07

## MECHANICAL-CHEMICAL SYNTHESIS AND PHYSICAL CHEMICAL STUDY OF PYRIDINE BORANE

Novosibirsk IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKIKH NAUK in Russian Vol 15, No 5, Sep 84 (manuscript received 9 Jan 83) pp 26-30

VOLKOV, V.V., MYAKISHEV, K.G. and KLIMOVA, O.A., Institute of Inorganic Chemistry, Siberian Department, USSR Academy of Sciences, Novosibirsk

[Abstract] The properties of pyridine borane, a selective reducing agent, have not been well studied. Also, a synthesis method not employing gaseous and toxic diborane and organic solvents would be desirable. Pyridine borane has been prepared from  $C_5H_5N \cdot HCl$  and  $NaBH_4$  crystals by activation of the reaction mixture with vibromilling. In the present work, pyridine borane was synthesized by vibromilling crystals of  $C_5H_5N \cdot HCl$  and lithium, sodium or potassium boride. Infrared spectra, melting and boiling points, density, refractive index, kinematic and dynamic viscosity and activation energy data are presented. Figures 3; references 4: 1 Russian, 3 Western. [59-12765]

## GROWING POTASSIUM BROMATE CRYSTALS FROM AQUEOUS SOLUTIONS OF LEAD AND SODIUM NITRATE

Novosibirsk IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKIKH NAUK in Russian Vol 15, No 5, Sep 84 (manuscript received 27 Dec 83) pp 51-55

KIDYAROV, B.I., NEV'YANTSEVA, R.R., DANDARON, N.D. and ZAYTSEVA, L.F.,  
Institute of Thermal Physics, Siberian Department USSR Academy of Sciences;  
Novosibirsk State University imeni Leninskiy Komsomol

[Abstract] The crystals of many halogenates are non-centrosymmetric and are of great interest in non-linear optics, acoustic electronics and other areas of applied physics. Until recently, only lithium iodate crystals have been used widely owing to the difficulties encountered in growing others. Since halogenate crystals normally decompose on melting, they are grown from aqueous solutions and a suitable solvent. It has been observed that full-grained crystals of potassium bromate cannot be grown from pure aqueous solutions and that the presence of nitric acid or the nitrates of lead, thorium, tellurium or vanadium have a positive effect. In the present work, piezoelectric and non-linearly optic crystals of potassium bromate 5-10 mm thick were grown from aqueous solutions of lead and sodium nitrates by a temperature and concentration gradient method. The presence of sodium nitrate promotes plate crystal formation while lead nitrate promotes rhombohedral crystals. Figures 3; references 9: 6 Russian, 3 Western.  
[59-12765]

UDC 541.183

SELECTIVITY OF ADSORPTION OF TRANSITION METAL CATIONS ON SULFONATE CATIONITE KU-2-4 FROM MULTICOMPONENT SOLUTIONS IN PRESENCE OF PYRIDINE

Novosibirsk IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKIKH NAUK in Russian Vol 15, No 5, Sep 84 (manuscript received 18 Nov 83) pp 23-25

AL'TSHULER, G.N. and KIRSANOV, M.P., Complex Department of Physical-Chemical and Ecological Problems, Institute of National Economy, Siberian Department, USSR Academy of Sciences, Kemerovo

[Abstract] Ion exchange equilibrium of a mixture of transition metal cations (copper, nickel and zinc) in water on sulfonate cationite KU-2-4 in the presence of a complex former (pyridine) was studied at 298 K. The possibility of calculating phase composition for the ion exchange process in the presence of a complex former for a multicomponent mixture of variously charged ions is demonstrated. Adsorption selectivity of the individual components is based entirely on the complex former. References 7: 4 Russian, 3 Western. [59-12765]

UDC 542.91:541.65:547.1'118

SYNTHESIS OF OPTICALLY ACTIVE O-METHYL-O-ARYLPHENYLTHIOPHOSPHONATES AND THEIR PROPERTIES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 10, Oct 84 (manuscript received 19 Dec 83) pp 2398-2400

DIMUKHAMEDOV, M.N., IRAIDOVA, I.S., KUDRINA, M.A. and NURETDINOV, I.A.,  
Institute of Organic and Physical Chemistry imeni A.Ye. Arbuzov, Kazan  
Branch, USSR Academy of Sciences

[Abstract] Optical isomers of O-methyl-O-2,3-dichlorophenylphenylthiophosphonate were prepared and tested for toxicity. For house flies, the levorotatory isomer showed a significantly higher LD<sub>50</sub> than either the racemic mix or the dextrorotatory isomer (195.0, 52.5, 16.5 µg/g respectively). Analogous results were found with white mice (300, 100, 90 mg/kg), indicating the usefulness of such compounds for investigating the stereospecific bioactivity of phosphoorganic compounds. References 5 (Western) [62-12672]

UDC 661.183.2:665.521

ADSORBENTS FROM HIGH MOLECULAR WEIGHT COMPOUNDS OF PETROLEUM

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 10, Oct 84 pp 9-10

POKONOVA, Yu.V., OLEYNIK, M.S., VARFOLOMEYEV, D.F. and MALIKOV, F.Kh.,  
Leningrad Technical Institute imeni Lensovet; Bashkir Scientific Research  
Institute of Petroleum Industry

[Abstract] Asphaltites with wide range of asphaltene content (35-80%) from West Siberia and Arlon deposits were investigated. They were semicoked for a period of 10 hrs increasing the temperature up to 500-550°C, at which temperature they were kept for one hour. As a result of this treatment, the atomic ratio of C:H increased from 0.83 to 2.2-2.4. From this material, hydrocarbon adsorbents were obtained with high mechanical strength, exceeding many industrial carbons in their adsorption characteristics. They can be used to trap organic solvent vapors from air, for extraction of gasoline from natural gasses, adsorption of dissolved materials and for catalytic purposes. References 6 (Russian).

[47-7813]

UDC 665.633:621.43.068.4:665.7.038.3

PRODUCTION OF HIGH OCTANE GASOLINE BY HYDROISOMERIZATION OF REFORMING CATALYSATES

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 10, Oct 84 pp 10-12

AKHMETOV, A.F., TANATAROV, M.A., GEORGIYEVSKIY, V.Yu. SHIPIKIN, V.V. BORTOV, V.Yu. and KILADZE, T.K., Ufa Petroleum Institute; Lenneftekhim Scientific Production Association

[Abstract] It was shown to be possible to reduce the content of hydrocarbons in hard reforming catalysates by 5% without lowering their octane number by hydrogenation of benzene; thus the requirements for expensive alkylate in production of unleaded gasoline AI-93 were lowered. The process used for production of this gasoline consisted of two stages: aromatizing reforming to yield a product with 60-70% aromatic hydrocarbons, followed by

hydroisomerization of a portion of these hydrocarbons. Analysis of the cost effectiveness showed that overall this process led to considerable savings. Figures 2; references 3 (Russian).  
[47-7813]

UDC 665.7.088.64

#### PRODUCTION OF DEPRESSOR ADDITIVE TO DIESEL FUEL BY COPOLYMERIZATION OF ETHYLENE WITH VINYLACETATE

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 10, Oct 84 pp 12-14

IVANOV, V.I., KRASNYANSKAYA, G.G., OKTYABR'SKIY, F.V. and YERMAKOVA, N.V.  
All-Union Scientific Research Institute of Petroleum Industry

[Abstract] The goal of this study was to synthesize copolymers of ethylenevinylacetate (VA) in cyclohexane as a solvent, to get effective depressors for diesel fuel. Pressure range of 10-30 MPa and temperature range of 130-180°C were evaluated using tert-butylperbenzoate as the initiator. It was shown that the depressor activity increased gradually with increased content of VA links up to 50%; above 50% the VA led to poor solubility. Optimal temperature for production of these depressors with maximally lowered filtration temperature was 130°C. This mixture was shown to be an effective depressor of diesel fuel. Figures 3; references 6 (Russian, 2 by Western authors).  
[47-7813]

UDC 621.892:665.637

#### HYDROENRICHMENT OF DEPARAFFINIZED OIL ON G-24/1 EQUIPMENT

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 10, Oct 84, pp 14-16

KHASANOV, A.K., NURMATOV, G., MIRUSMANOVA, M., GORBUSHIN, B.M. and FEDOROVA, R.I., VNIKhTIMP [All-Union Scientific Research Chemical Technology, Machine Design?]; Ufa Scientific Production Plant imeni 22d Congress, CC of the CP

[Abstract] Experimental results were reported of the evaluation of aluminum-molybdenum D-60 catalyst used in hydroenrichment of deparaffinized oil from West-Siberian paraffins. The highest degree of hydrodesulfurization (46%) and increased index of viscosity were obtained under the following conditions: temperature--290-300°C, pressure--2.8 Mpa, flow rate of crude material--1.58 hr<sup>-1</sup>; the oil became slightly turbid under these conditions and its solidification temperature went up. During this hydrogenation process of aromatic hydrocarbons and tarry substances, hydroisomerization of paraffin-naphthene hydrocarbons took place. The longevity of this catalyst was 3 years and it could be regenerated by oxidative coke calcination from its surface. Thus it was shown that the catalyst D-60 could be used effectively instead of the commercial AKM catalyst. References 5 (Russian, 1 by Western authors).  
[47-7813]

## POLYFUNCTIONAL ADDITIVE TO FUELS

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 10, Oct 84 pp 22-23

ZAGIDULLIN, R.N., GIL'MUTDINOV, A.T. and MAMYNOV, V.V., Sterlitamaks Production Association "Kaustik"

[Abstract] A chelate compound, salicylal- $\beta$ ,N-aminoethylpiperazine (I), was synthesized in an attempt to get a metal deactivator for motor oil. The compound was obtained in a 96% yield by heating equimolar quantities of  $\beta$ ,N-aminoethylpiperazine and salicyl aldehyde for 15 min in acetone; its melting point was 46°C. This product is used normally in 25 or 50% solutions in xylene. Its action is based on forming chelates with active copper: the metal ion binds to the complex-forming heteroatoms. With I added, the gasoline and oil samples stored well, much lower levels of tar were formed and the additive appeared to be an anticorrosive agent preventing the rusting process of the metal containers. Figures 2; references 5: 2 Russian, 3 Western.

[47-7813]

## ANTIFRICTIONAL AND WEAR RESISTANT PROPERTIES OF DIALKYLDITHIOAMINOPHOSPHATES

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 10, Oct 84 pp 23-25

BORSHCHEVSKIY, S.B., SHABANOVA, Ye.V., MARKOV, A.A. and REBROV, I.Yu.,  
All-Union Scientific Research Institute of Petroleum Industry

[Abstract] Effect of the structure of the amino group in dialkldithioamino-phosphates (I) on wear resistance and antifrictional properties of mineral oils, their thermal stability and adsorbability on metal surfaces was investigated. Analysis of experimental results showed that the structure of the amino group in I did have a definite effect on thermal stability and adsorbability. Based on this, an ash-free additive ADTP was developed containing at least 2% of nitrogen and 3.3% of phosphorus, showing good antifrictional properties and lowered wear of a steel surface. Figure 3; references 8: 7 Russian, 1 Western.

[47-7813]

## POLYFUNCTIONAL ADDITIVES BASED ON DIETHYLENETRIAMINE ALKENYLSUCCINIMIDE

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 10, Oct 84 pp 25-28

YEVSTAF'YEV, V.P., SHOR, G.I., IVANOVA, Ye.A. and MELAMED, S.O., All-Union Scientific Research Institute of Petroleum Industry

[Abstract] Increasingly more demanding requirements placed on lubricating oils necessitate addition of reagents with various functional properties. Interaction between these additives may lead to neutralization of their effectiveness. To avoid some of these problems, the authors proposed the use of a polyfunctional ashless additive C-5A: diethylenetriamine alkenylsuccinimide. Reaction of C-5A with a heterocyclic compound yielded the polyfunctional additive VSP which inhibited corrosion of copper, improved wear resistance and lowered formation of precipitate. Polyfunctional additives can also be obtained from C-5A and transition metals (molybdenum). Further improvement could be achieved by adding sulfur and phosphorous modifiers. Hence, by selective modification of C-5A it could be used in synthesis of a variety of polyfunctional, ashless additives. References 9 (Russian, 2 by Western authors). [47-7813]

UDC 665.765-404.0.35.6:532.133

## RHEOLOGICAL PROPERTIES OF OIL HYDROCARBONS

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 10, Oct 84 pp 31-33

ZIMINA, K.I. and BEZHANIDZE, A.M., All-Union Scientific Research Institute of Petroleum Industry

[Abstract] In order to study their rheological properties, the oils must be subjected to thermal diffusion separation (TDS) yielding fractions differing in their physical-chemical properties and hydrocarbon composition. The first TDS fraction consists principally of paraffin and monocyclic naphthenes with long side chains; the last--of polycyclic aromatic and naphthenic hydrocarbons with short side chains. Using an example of Mk-8 oil, the solidification temperature of various TDS fractions was studied as a function of their rheological properties. A gradual change was noted in the solidification temperature going from the first fraction to the fifth, related to the density of these fractions. This phenomenon was also observed with many other oils, leading to a conclusion that this property could be common to all oils. Figures 3; references 5: 4 Russian, 1 Western. [47-7813]

UDC 541(64+126)

LIMITING COMBUSTABILITY RATES OF POLYMER MATERIALS

Moscow VYSOKOMOLEKULARNYE SOYEDINENIYA in Russian Vol 26, No 10, Oct 84  
(manuscript received 6 May 83) pp 2181-2185

VOROB'YEV, V.N., BYCHIKHINA, L.V., BAZENKOVA, E.N. and PEROV, B.V.

[Abstract] It has been shown previously that the rate of flame propagation of a polymer film decreases with increasing film thickness. In the present work combustability studies were made of polyethylene, polyamide-12, polycarbonate and polysulfone films as a function of oxygen concentration, and the effects of film thickness and direction of burning on flammability index, and that of oxygen concentration on flame propagation rate. The oxygen index for non-coking polymers polyethylene and polyamide-12 was observed to fall with increasing film thickness, while that of the coking polymers (polysulfone and polycarbonate) increased. It was established that within the limits of oxygen concentration conditions, the product of mass combustion rate and film thickness remains constant. Figure 1; references 9 (Russian). [51-12765]

UDC 541.64:539.2

STRUCTURE AND PROPERTIES OF EPOXYACRYLATE RESINS

Moscow VYSOKOMOLEKULARNYE SOYEDINENIYA in Russian Vol 26, No 10, Oct 84  
(manuscript received 7 Sep 82) pp 2046-2051

MARTYNYUK, L.I., KHEMELENKO, L.I. and MATYUSHOVA, V.G., Institute of Chemistry of High Molecular Weight Compounds, UkrSSR Academy of Sciences

[Abstract] Polyisocyanates are added to epoxyacrylate resins to overcome loss of elasticity due to formation of brittle materials during hardening. An excess of polyisocyanates in the composition results in enhanced strength and deformation characteristics. In the present work equilibrium swelling, equilibrium modulus of elasticity and scanning calorimetry were used to study the relationship of composition to degree of cross-linking and glassification

temperature in resins of 400-1000 molecular weight. During ultra-violet hardening, polymer structure formation includes microheterogeneities as a result of the different transformation rates of the unsaturated bonds and the free isocyanate groups. This then affects the physical-mechanical properties of the hardened material. Excess isocyanate intensifies microaggregation to form a non-uniform network having local areas of enhanced density of cross-linking. Figures 4; references 11: 8 Russian, 3 Western. [51-12765]

UDC 541.64:535.557

FLOW BIREFRINGENCE AND CONFORMATIONAL CHARACTERISTICS OF POLYAMIDE HYDRAZIDE IN DIMETHYLSULFOXIDE

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 26, No 10, Oct 84 (manuscript received 31 Jan 83) pp 2057-2061

POGODINA, N.V., STARCHENKO, L.V., KHRUSTALEV, A.Z. and TSVETKOV, V.N, Institute of Physics at Leningrad State University imeni A.A. Zhdanov

[Abstract] Flow birefringence, orientation angles and intrinsic viscosities were measured for 19 samples of aromatic polyamide hydrazides in dimethylsulfoxide solvent. A Kuhn segment length of  $A = (250 \pm 30) \cdot 10^{-8}$  cm for the polyamide hydrazide molecule was determined from molecular weight relationships to birefringence and coefficient of rotary diffusion in conjunction with optical and hydrodynamic theories of rigid worm-shaped chains. The value for chain rigidity correlates well with data obtained by light diffusion of the polymer. Figures 5; references 13: 10 Russian, 3 Western. [51-12765]

UDC 541.64:547.672

STUDY OF CROSS-LINKING PROCESS OF LINEAR POLYSTYRENE DURING REACTION WITH 9,10-bis-(CHLOROMETHYL)ANTHRACENE

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 26, No 10, Oct 84 (manuscript received 7 Feb 83) pp 2071-2076

KRAKOVYAK, M.G., ANAN'YEVA, T.D., ANUFRIYEVA, Ye.V., NEKRASOVA, T.N., KLENIN, S.I., KRIVOBOKOV, V.V. and SKOROKHODOV, S.S., Institute of High Molecular Weight Compounds, USSR Academy of Sciences

[Abstract] By using linear chain cross-linking of polystyrene with 9,10-bis-(chloromethyl)anthracene at the molecular level as an example, the topological structure formation process of the cross-linked polymer was studied at that stage of the process where soluble polymer network structural embryos start to form. UV-spectra, polarizing luminescence and hydrodynamics were used to study the formation reactions and the content and distribution of bridge structures

in the cross-linked macromolecule. It was established that, as the cross-linked polymer is being formed, a structural inhomogeneity of the polymer system develops which is related to the non-uniform distribution of inter- and intra-molecular cross-links. Figures 2; references 16: 10 Russian, 6 Western. [51-12765]

UDC 541.64:547.256.2

DIENE POLYMERIZATION CATALYSTS BASED ON TITANIUM HALIDES AND COMPLEXES OF ALUMINUM-ORGANIC COMPOUNDS WITH ALKALINE EARTH METAL ALKYL

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 26, No 10, Oct 84 (manuscript received 9 Mar 83) pp 2088-2092

BRESLER, L.S., KISIN, K.V. and LUBNIN, A.V., All-Union Scientific-Research Institute of Synthetic Rubber imeni S.V. Lebedev

[Abstract] A study was made of the behavior of titanium-magnesium catalysts in butadiene polymerization and the effects of alkaline earth metals on the activity and stereospecificity of the catalyst. Titanium tetrachloride was reduced with  $5\text{MgBu}_2 \cdot \text{AlEt}_3$  and  $\text{Ca}[\text{AlEt}_4]_2$  complexes. Reaction products not containing tetra-valent titanium were tested as catalysts in 1,3-butadiene polymerization. Catalyst systems obtained by reduction of  $\text{TiCl}_4$  and  $\text{TiI}_4$  form 1,4-polybutadiene with a preponderance of cis-1,4-linkages, if the ratio of metal-carbon bonds to titanium halide molecules in the catalyst does not exceed 10. At high concentrations of  $\text{Ca}[\text{AlEt}_4]_2$ , 1,2-polybutadiene forms due to copolymerization of side vinyl groups. References 11: 3 Russian, 8 Western. [51-12765]

UDC 541(64+14):539.3

PHOTOREACTIONS OF PRIMARY MACRORADICALS DURING MECHANICAL DEGRADATION OF SILK FIBROIN

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 26, No 10, Oct 84 (manuscript received 4 May 83) pp 2155-2158

L'VOV, K.M., GASYMOV, O.K. and MAMEDOV, Sh.V., Institute of Chemical Physics, USSR Academy of Sciences; Institute of Physics, AzSSR Academy of Sciences

[Abstract] It was previously shown that mechanical degradation of proteins results in peptide chain rupture and free radical formation. Degradation of silk fibroin at 77K results in rupture of the peptide chain skeleton at the  $\text{C}_{\alpha} - \text{C}$  bond to form two types of primary macroradicals:  $-\text{NH}-\text{C}_{\alpha}^{\cdot}$  and  $\text{CO}-\text{NH}-\cdot$ . In the present work, photochemical reactions of these primary radicals

77K were studied. Under light of 333-390 nm wavelength, the CO-NH- radical ruptures at the peptide bond to form a radical not sensitive to light, while the other radical undergoes typical photochemical conversions. These reactions confirm a previously made conclusion on rupture of the C $\alpha$ -C bond of the peptide chain during mechanical degradation of silk fibroin. Figures 2; references 14: 13 Russian, 1 Western.  
[51-12765]

UDC 534.6:677.4

#### RELATIONSHIP OF ACOUSTIC CHARACTERISTICS TO MOLECULAR ORIENTATION AND STRENGTH OF CHEMICAL FIBERS

Moscow KHIMICHESKIYE VOLOKNA in Russian No 5, Sep-Oct 84 (manuscript received 2 Sep 83) pp 26-28

YUNUSOV, B.Kh. and NOSOV, M.P.

[Abstract] Information on the structure of chemical fibers and the relaxation processes taking place in them may be obtained by simultaneous analysis of the rates of longitudinal propagation and absorption of ultrasonic waves. In the present work the relationship between the propagation rate (C) and the extinction coefficient  $\alpha$  was determined for polyethylene, polycapromide, polyvinyl alcohol fibers, viscose and synthetic high molecular monofilaments obtain by various methods of heat treatment. It is shown that any structural changes in oriented fibers that result in a change in molecular orientation also cause changes in the absorption of ultrasonic waves. Figures 2; references 8: 7 Russian, 1 Western.  
[50-12765]

UDC 678.742.3.019.677.4.016

#### STUDY OF ATMOSPHERIC AND LIGHT RESISTANCE OF POLYPROPYLENE FIBERS AND FILMS

Moscow KHIMICHESKIYE VOLOKNA in Russian No 5, Sep-Oct 84 (manuscript received 13 Jan 84) pp 28-30

KOLOMYTSYN, V.P., YEFIMOV, A.A., IVANENKO, P.F., POPOVA, Z.G. and ZVEREV, M.P.

[Abstract] A study was made of the effectiveness of some spatially-inhibited amines as stabilizers in industrial grade polypropylene fibers. Tests under accelerated laboratory and natural ageing conditions showed that a currently used imported stabilizer (Tinuvin 327, Ciba-Geigy) can be replaced with the domestically-produced spatially inhibited amine Diacte 5. The accumulation of carbonyl groups during light-oxidative destruction of polypropylene films under laboratory conditions ("Xenotest 1200") correlates well with the decrease in strength of industrial grade fibrillated fibers and with the increase in yield stress of the polymer during atmospheric ageing. Figures 3; references 11: 6 Russian, 5 Western.  
[50-12765]

## STUDY OF PARAMETERS OF SUPRAMOLECULAR STRUCTURE OF FLUORINE-CONTAINING MONOFILAMENTS

Moscow KHIMICHESKIYE VOLOKNA in Russian No 5, Sep-Oct 84 (manuscript received 30 Nov 83) pp 31-32

BEZPROZVANNYKH, A.V., TARAKANOV, B.N., SOKOLOV, Yu.I., KLIMENKO, I.B., PODLESKAYA, N.K. and VOL'F, L.A.

[Abstract] A study shows that the structure-sensitivity index increases linearly with the softening point index for monofilament copolymers of tetrafluoroethylene-ethylene and tetrafluoroethylene-perfluoroalkylvinyl ether. X-ray analysis shows a relationship between softening point index and crystallite defect exists for tetrafluoroethylene-ethylene copolymer. The tensile strength of tetrafluoroethylene-perfluoroalkylvinyl ether copolymer monofilament is less than that of tetrafluoroethylene-ethylene copolymer. The former also has a high structure-sensitivity index. Figures 1; references 6 (Russian).  
[50-12765]

UDC 541 (64+515)

## NEW STABILIZERS FOR VINYL MONOMERS

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNLOGIYA in Russian Vol 27, No 9, Sep 84 (manuscript received 13 Dec 82) pp 1065-1069

GOL'DFEYN, M.D., SKRIPKO, L.A., KOSYREVA, R.V. and KON'KOVA, L.V., Chair of Chemical Physics, Saratov State University imeni N.G. Chernyshevskiy

[Abstract] Effect of aromatic amines on radical polymerization of vinyl monomers was studied on styrene, methylmethacrylate and butylmethacrylate. It was shown that during polymerization without sulfuric acid, the amines reacted with active radicals with unshared electron at the oxygen atom acting as effective antioxidants. In presence of sulfuric acid, the induction period had a nonlinear relationship to the concentration of the inhibitor. The role of sulfuric acid is to increase the rate of the breakdown of polymer peroxides and to lower the reaction rate of the chain break. Reaction mechanisms were proposed and stoichiometric coefficients of inhibition were determined. Figures 2; references 4: 3 Russian, 1 Western.  
[61-7813]

STUDY OF EFFECT OF COBALT AND COPPER METHACRYLATES ON COPOLYMERIZATION OF METHACRYLATE WITH METHACRYLIC ACID

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNLOGIYA in Russian Vol 27, No 9, Sep 84 (manuscript received 20 Dec 82) pp 1070-1073

GOYUKH, Ye.A., KUZNETSOV, Ye.V., KHAZYATOVA, L.Kh., PROKOP'YEV, V.P. and AKHMEROV, M.A., Department of Plastic Technology, Kazan Chemical-Technologic Institute imeni S.M. Kirov

[Abstract] The effect of Co and Cu methacrylates (MAC) on the rate of block radical copolymerization of methylmethacrylate (MMA) and MAC was investigated by the NMR impulse method. Using the Mayo-Lewis and Fineman-Ross methods, effective binary copolymerization constants for MMA ( $r_1$ ) and MAC ( $r_2$ ) in presence of Co and Cu MAC and in their absence were determined, showing the effect of Co and Cu MAC on  $r_1$  and  $r_2$ . The IR spectra of the polymerizing system and of the polymers formed were studied showing characteristic absorption bands in the region of 800-1000  $\text{cm}^{-1}$ , typical of polymethacrylates with syndio or isotactic structures. The characteristics of the synthetic method and the properties of these copolymers were related to complex-forming properties of these methacrylates. Figures 3; references 10: 9 Russian, 1 Western.

[61-7813]

## RADIATION CHEMISTRY

UDC 539.196

## ISOTOPE EXCHANGE BETWEEN HEXAFLUORIDE AND PENTAFLUORIDE OF URANIUM

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 3, No 10, Oct 84  
(manuscript received 25 Apr 83) pp 1438-1441

GRIGOR'YEV, G.Yu., DOROFYEV, S.B., ZAMETALCV, V.A., KOLESNIKOV, O.N. and  
TERENT'YEV, A.A., Institute of Atomic Energy imeni I.V. Kurchatov, Moscow

[Abstract] A study of isotopic transfer of the fluorine atom from  $UF_6$  to  $UF_5$  on the surface of condensed uranium pentafluoride shows that this process is very rapid and may be a deciding factor leading to loss in selectivity during dissociation of uranium hexafluoride. The parameters found in this work may be used to evaluate the negative effect of this process and the selection of a method to minimize it during laser separation of  $UF_6$ . Figures 2; references 6: 4 Russian, 2 Western.  
[45-12765]

UDC 678.4.065:678.4.046.5:634.0.864

PRODUCTION OF LIGNO-TALLOL PRODUCT LT-21 AND ITS EVALUATION IN TIRE RUBBER

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA  
TEKHNOLOGIYA in Russian Vol 27, No 9, Sep 84 (manuscript received 15 Nov 82)  
pp 1084-1086

BOGOMOLOV, B.D., YEMEL'YANOV, D.P., TIRANOV, P.P. and YUR'YEVA, A.K.,  
Department of the Chemistry of Wood Pulp, Cellulose and Hydrolysis Products,  
Archangelsk Forestry Technical Institute imeni V.V. Kuybyshev; Yaroslavl Tire  
Plant

[Abstract] Ligno-tallol product LT-21 is a dark-brown powder consisting of two parts of lignine sulfate and one part tallol oil. This product is not dusty and can be transported easily; it does not cake on storage, is not hygroscopic, it can be easily measured out and disperses well in rubber mixtures. Laboratory and industrial tests showed that the use of LT-21 in place of fatty acids and rosin oil led to improved properties of the vulcanizates: stronger bonds with synthetic fibers, higher resistance to heat aging, to repeated stretching and to excessive bending. References 7 (Russian).  
[61-7813]

UDC 678.046.84

STUDY OF EFFECTIVENESS OF 5-AMINO-1,2,3,4-THIATRIAZOLE, A PORE FORMING AGENT FOR RUBBERS BASED ON AKI-3NTP

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA  
TEKHNOLOGIYA in Russian Vol 27, No 9, Sep 84 (manuscript received 10 Dec 82)  
pp 1087-1090

LYAPINA, T.Yu., BLOKH, G.A., TARKHOV, G.V. and MISHINA, I.M., Department of Chemistry and Technology of Elastomer Processing, Dnepropetrovsk, Chemical-Technological Institute imeni F.E. Dzerzhinskiy

[Abstract] Properties and effectiveness of the pore-forming agent 5-amino-1,2,3,4-thiatriazole (TTA) and its effect on the vulcanization of rubber mixtures based on SKI-3NTP were studied and compared to another foaming agent

p-phenylmethylethanesulfonyl hydrazide (ChKh 2-5). It was shown to be a good agent for production of porous resins capable of accelerating the vulcanization process. In comparison to ChKh 2-5, TTA led to improved tearing strength, gave more uniform porosity and imparted no odor or color to the specimens. Figures 2; references 2 (Russian, 1 by Western author).  
[61-7813]

COMPLEX SCHEMES FOR TREATMENT OF ELECTROPLATING PRODUCTION WASTE WATER

Moscow VODOSNABZHENIYE I SANITARNAYA TEKHNICA in Russian No 10, Oct 84 pp 4-6

BELEVTSSEV, A.N., KANDZAS, P.F. and MILOVANOV, L.V., candidates of technical sciences, All-Union Scientific-Research Institute of Water Supply, Sewage, Hydrotechnical Equipment and Engineering Hydrogeology

[Abstract] Although electroplating shops use relatively small amounts of water, the total number of such shops is great. Moscow alone has over 800 enterprises employing about 400 different industrial solutions which are always being improved on. The various methods for treating waste effluents from these plants is reviewed. Local effluents are separated and treated in some specific manner, depending on the nature of the contaminant, e.g. cyanides, hexavalent chromium or fluorides. Treatment consists mainly of closed-cycle electrochemical oxidation, ozonization or catalytic oxidation. A widely used non-reagent method employs soluble sheet anodes (electrocoagulation) to reduce chromate and bichromate ions with divalent iron. This method was recently improved by the Far East Branch of VODGEO [All-Union Scientific-Research Institute of Water Supply, Sewage, Hydrotechnical Equipment and Engineering Hydrogeology] by substituting steel shavings for the sheet steel. Closed-cycle systems with recovery of valuable components can be developed by using non-reagent methods for treating cyanogen- and chromium-containing effluents followed by desalination of eluents. References 6 (Russian). [64-12765]

## TREATING WASTE EFFLUENT FROM LYSINE AND ENTEROBACTERIN PRODUCTION

Moscow VODOSNABZHENIYE I SANITARNAYA TEKHNIKA in Russian No 10, Oct 84 pp 23-24

BONDAREV, A.A., PIROGOVA, M.A., candidates of technical sciences; OBOLENSKAYA, M.T., engineer, All-Union Scientific-Research Institute of Water Supply, Sewage, Hydrotechnical Equipment and Engineering Hydrogeology and DMITRIYEVA, A.A., engineer, All-Union Scientific-Research Institute of Biochemical Machine Design

[Abstract] Lysine and enterobacterin are used to improve livestock weight and quality. They are produced by a fermentation process, and at one plant, "Progress", (Stepnogorsk, Kaz SSR) the effluent comprises about 10,000 m<sup>3</sup>/day. It has 5,000-20,000 mg/liter of mineral and organic nitrogen and 1500 degrees color index. A treatment process based on adsorption was developed which produces clear water of 3-5 mg/liter BOD and which may be recycled for further production usage. The All-Union Scientific-Research Institute of Biochemical Machine Design has designed facilities (under construction) capable of treating the 10,000 m<sup>3</sup>/day effluent of the "Progress" plant. This will have an annual economic effect of about 4 million rubles. References 4 (Russian). [64-12765]

-END-

**END OF**

**FICHE**

**DATE FILMED**

11 Feb 1985